Herring Stock Estimates from Spawn Surveys for the North Coast of British Columbia in 1986

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February 1988

Canadian Manuscript Report of Fisheries and Aquatic Sciences No. 1976

Fisheries and Oceans Pêches et Océans

Canada

88-05774/

Canadian Manuscript Report of Fisheries and Aquatic Sciences

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by

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Cat. No. Fs 97-4/1976E ISSN 0706-6473

Correct citation for this publication:

Haegele, C. W. and J. F. Schweigert. 1988. Herring stock estimates from spawn surveys for the North Coast of British Columbia in 1986. Can. MS Rep. Fish. Aquat. Sci. 1976: 28 p.

ABSTRACT

Haegele, C. W. and J. F. Schweigert. 1988. Herring stock estimates from spawn surveys for the North Coast of British Columbia in 1986. Can. MS Rep. Fish. Aquat. Sci. 1976: 28 p.

From diving and surface surveys of spawn, 24,354 tonnes of herring were estimated to have spawned in the North Coast District of British Columbia in 1986. In Chatham Sound (Areas 3 and 4N) 16,835 tonnes spawned in three waves, with 97% spawning in the second wave. On north Porcher Island (Area 4S) 1939 tonnes spawned in a first wave in Hunt Inlet and 436 tonnes spawned in a second wave in Malacca Passage, for a total of 2375 tonnes. An estimated 4181 tonnes spawned on south Porcher Island (Area 5N) and 963 t in Area 5S. Estimated spawner biomass was three times greater in 1986 than in 1982, when the last diving survey was made. Spawn surveyed by divers was deposited over a narrow depth range on gradually sloped shorelines.

RÉSUMÉ

Haegele, C. W. and J. F. Schweigert. 1988. Herring stock estimates from spawn surveys for the North Coast of British Columbia in 1986. Can. MS Rep. Fish. Aquat. Sci. 1976: 28 p.

D'après les résultats de relevés du frai effectués en plongée autonome et à la surface, on a déterminé que 24 354 tonnes de hareng ont frayé dans les eaux du district de la Côte Nord de la Colombie-Britannique en 1986. Dans la baie Chatham (zones 3 et 4N), 16 835 tonnes ont frayé en trois vagues dont 97% ont frayé au cours de la deuxième vague. Sur le littoral nord de l'île Porcher (zone 4S), 1 939 tonnes ont frayé au cours d'une première vague dans l'inlet Hunt et 436 tonnes ont frayé au cours d'une deuxième vague dans le passage Malacca, soit un total de 2 375 tonnes. Selon des estimations, 4 181 tonnes ont frayé sur le littoral sud de l'île Porcher (zone 5N) et 963 tonnes dans la zone 5S. La biomasse estimative de géniteurs en 1986 était trois fois supérieure à celle déterminée en 1982, année du dernier relevé en plongée autonome. Le frai observé par les plongeurs était déposé à un faible écart de profondeurs sur des fonds à pente graduelle.

INTRODUCTION

Herring stocks in the North Coast District of British Columbia (Statistical Areas 3 to 5) supported substantial reduction fisheries from the 1930s to the collapse of stocks in 1967. Catches from 1946 to 1967 averaged 25,000 tonnes and stocks were estimated to have averaged 70,000 tonnes for the period 1951 to 1970 (Hourston 1981). Between 1967 and 1970 a food and bait fishery continued to operate in Browning Entrance (Area 5) and an average of 1500 tonnes was landed annually. In 1971 a sac roe fishery was begun on the North Coast and the Browning Entrance food and bait fishery continued. By 1979 stocks appeared to have declined to a level that the roe fishery was discontinued in Chatham Sound (Area 3 and 4N). In 1982, the remainder of the North Coast was closed to all fishing, and remained closed for 1983, partially on the evidence of low stocks from the results of a diving survey of herring spawn (Schweigert and Haegele 1984).

Herring spawn was again surveyed by divers in 1986 to determine whether stocks had recovered from the 1982 levels, especially since the fishery had been reopened in 1984 with catches increasing from 3533 to 8305 tonnes in the three years. Unfortunately, available resources and weather did not permit a complete diving survey, but spawns not surveyed by divers were surveyed from the surface. The 1986 diving survey and the complementary results of the surface survey are the subject of this report.

METHODS

Herring spawns were surveyed either by SCUBA divers or by traditional surface survey techniques. In the surface survey, visual observations were made from a boat, frequently a viewing box was used to enhance bottom visibility, and, in some instances, this was supplemented by snorkelling. Grapples were used to determine the presence of and obtain samples of spawn. From these observations the length and width of spawn and the layers of eggs were estimated. The observed length and an adjusted width was used to calculate the area of the spawn. Egg density was estimated from egg layer observations. The equations and parameter estimates for these adjustments are given by Haist et al. (1986):

$$(1)\quad Width_{adj} = \exp\left[0.375 \log_e (Width_{obs}) + 3.123\right]$$

$$(2)\quad Eggs \cdot m^{-2} = 75861 + 105321 \cdot Lay_{av}$$

To compare 1982 and 1986 surveys, the analysis of the data from the 1982 North Coast spawn survey (Schweigert and Haegele 1984) was expanded by the addition of surface survey data.

Egg deposition on the giant kelp (Macrocystis sp.) was estimated separately from egg deposition on the bottom vegetation and bottom substrate. The bottom vegetation and substrate survey followed a two-stage sampling design (Schweigert et al. 1985). Transects perpendicular to the shore were the primary sampling unit and 0.5 sq. m quadrats sampled along the transect were the secondary sampling unit. Samples consisted of all the rooted or attached vegetation, and the eggs adhering to it, within the quadrat. Layers of eggs, percent cover of the vegetation, and the dominant vegetation type and depth were estimated by divers for each quadrat. Samples were weighed and weighed subamples were preserved in Gilson's fluid and egg counts obtained. Eggs on the bottom substrate were estimated from diver estimates of layers of eggs and percent of bottom covered by eggs (Haegele et al. 1979) and added to eggs on vegetation.

Transects were established at nearly equal intervals and samples were collected at equal intervals along the transect with the spacing determined by the width of the spawn. The mean egg density and 95% confidence intervals were calculated for each spawn and transect means were weighted by transect length (Schweigert et al. 1985). The inner and outer edge of spawns were determined from transect measurements. The limits of a spawn beyond the outer transects was determined by exploratory dives. This information was plotted on maps of marine vegetation, where available, at a scale of 1:6000 (Haegele and Hamey 1982). The boundaries of the spawn was contoured, and the area of the spawn estimated. Where vegetation maps were not available, marine charts were used.

The egg deposition on Macrocystis sp. was estimated using a procedure developed by Haegele and Schweigert (1985). Briefly, the number of plants and fronds (mature and immature) within 1 m on either side of the transect were counted, 1 or 2 plants were harvested at each transect, and the mean number of eggs per plant or frond were estimated. This was done by counting the number of fronds per plant, cutting the plant in 1 m sections, which were weighed, and preserving 1 blade and associated stipe, which was also weighed, per section. The number of eggs in the preserved material were determined. The occurence of Macrocystis sp. was plotted on the maps and the area of the Macrocystis sp. beds was measured. The number of eggs deposited was the product of area, frond density, and mean number of eggs per mature frond. The procedure developed by Haegele and Schweigert (1985) determined that this was the best estimator. However, estimates using plants and all fronds were also calculated.

The biomass (tonnes) of spawners was estimated from the estimated number of eggs and a relative fecundity of 100 million eggs per tonne of spawning fish (Hay 1985).

RESULTS

Diving survey information was collected on 26 transects, with spawn on bottom vegetation and bottom substrate occurring on 15 transects and spawn on Macrocystis sp. occurring on 13 transects (Table 1). A number of immature Macrocystis sp. plants (i.e. plants with no mature fronds) were observed (Appendix Table 1), but, since no immature plants were harvested, these plants were not included in the egg estimates. The immature plants had only a few scattered eggs and their exclusion will result in a slight underestimate of eggs. Macrocystis sp. plants were up to 19 m long, had up to 21 mature fronds per plant, between 0.1 and 4.5 layers of eggs, and as many as 8 million eggs per plant (Appendix Table 2). Spawn on bottom vegetation was deposited over a narrow depth range on a gradually sloped shoreline (Table 2). The average slope was 0.0204, a rise of 2 m in 100 m. Percent cover of vegetation, egg layers, and egg density decreased with depth (Table 3), but differences between the intertidal and subtidal zone were not significant (Student t-test). Sea grasses and filamentous red algae were the most common bottom vegetation (Table 4).

The 1986 adult herring biomass on the North Coast, estimated from the spawn surveys, was 24,345 tonnes. It was estimated from diving surveys that 2021 tonnes spawned on Macrocystis sp. (Table 5) and 10,179 tonnes on bottom vegetation and bottom substrate (Table 6), and it was estimated from surface surveys that 445 tonnes spawned on Macrocystis sp. (Table 5) and 11,709 tonnes on bottom vegetation and bottom substrate (Table 7). Individual spawns (Fig. 1) are described below.

CHATHAM SOUND

Herring spawned in three waves in Chatham Sound (Area 3 and 4N) in 1986. The first wave spawned in Stumaun Bay on March 29, the second wave spawned between Pearl Harbour and Devastation Island principally from April 21 to 23, and the third wave spawned on Finlayson Island on May 5. The first and third wave spawns accounted for only 3% of the spawn and were not surveyed by divers, while approximately 66% of the second wave spawns were surveyed by divers.

A very light spawn at South Island and in Pearl Harbour, surveyed on two transects (Fig. 2), was deposited by 7 tonnes. A spawn at Shattock Point of moderate egg density, surveyed on four transects (Fig. 2), was deposited by 797 tonnes. At Simpson Point, a spawn of light egg density in three patches, surveyed on three transects (Fig. 3), was deposited by 221 tonnes. The spawn at Ryan Point, surveyed on three transects (Fig. 4), was deposited at moderate egg density by 9681 tonnes, of which 627 tonnes spawned on Macrocystis sp.

The second wave spawns surveyed only from the surface were extensions of spawns surveyed by divers: Burnt Cliff Island, between South Island and Shattock Point; Shattock Point to the east of the spawn surveyed there by divers; Big Bay to the east of Simpson Point; Tree Bluff and Slippery

Rock between Simpson Point and Ryan Point; and Duncan Bay, Tugwell and Devastation islands to the south of Ryan Point. As well, a small patch of spawn in Pearl Harbour was not surveyed by divers. Collectively, these spawns were deposited by 5553 tonnes at light to moderate egg densities. Total estimated second wave spawner biomass was 16,259 tonnes.

The first wave spawn at Stumaun Bay was small and estimated to have been deposited by 94 tonnes. The third wave spawn on Finlayson Island was deposited by an estimated 482 tonnes, of which 51 tonnes spawned on east Finlayson Island and 431 tonnes spawned on west Finlayson Island. Total Chatham Sound spawner biomass was estimated at 16,835 tonnes, only 1% of which spawned in Area 3.

NORTH PORCHER ISLAND

Herring spawned on north Porcher Island (Area 4S) in 1986 in two waves: in Hunt Inlet on April 24 and 25 and in Malacca Passage on May 7. The Hunt Inlet spawn was considered to have been completely surveyed by divers, however, surface surveys identified eight patches of spawn that occurred in locations where no spawn was located on transects. This could be attributed to the patchy occurence of spawn throughout the inlet. The second wave spawn was not surveyed by divers.

Spawn in Hunt Inlet was deposited principally on Macrocystis sp., with no spawn on bottom vegetation or bottom substrate. On three transects (4, 6 and 11 in Fig. 5), devoid of Macrocystis sp., eggs were deposited on bottom vegetation and substrate. As well, three small patches of spawn south of the narrows, too small and discontinuous to be efficiently surveyed with the transect technique, were surveyed on spot dives. About 100 tonnes spawned on the bottom vegetation and substrate, 40 tonnes north of the narrows and 60 tonnes south of the narrows. The spawn on Macrocystis sp., surveyed by divers, was deposited by an estimated 1394 tonnes. The spawn on Macrocystis sp. from surface survey observations was deposited by an estimated 445 tonnes. The second wave spawn in Malacca Passage was deposited at moderate egg density by an estimated 436 tonnes. Total Area 4N spawner biomass therefore was estimated at 2375 tonnes, 18% of which spawned in the second wave.

SOUTH PORCHER ISLAND

Herring spawned in south Porcher Island (Area 5N) in 1986 in two waves, the first from April 26 to 28 and the second on May 1. Divers did not survey any of this spawn, however, it was surveyed from the surface in 69 patches. The first wave spawns were estimated to have been deposited by 3727 tonnes, while 454 tonnes spawned in the second wave in Wally Bay. Approximately 60% of the total 4181 tonnes spawned in Freeman Passage.

OTHER AREA 5

Nine patches of spawn, deposited on April 30, 1986 in Kingkown Inlet (Area 5S), were surveyed from the surface. It was estimated that this spawn was deposited by 963 tonnes.

DISCUSSION

Time for diving surveys was limited and sampling was not sufficient to achieve a 95% confidence interval of 25% of the mean for egg density estimates. There were fewer than optimal transects per km (after Schweigert et al. 1985) for all of the spawns and optimal samples per transect were achieved for only two of the spawns (Table 8). Hence, the 95% confidence interval for egg density on bottom vegetation and substrate were quite broad at 43% and 51% of the mean for the two major spawns and between 11% and 111% of the mean for the three minor spawns. The 95% confidence interval for eggs on Macrocystis sp. was 41% of the mean when fronds were used and 45% of the mean when plants were used as the estimator. Estimates using plants were approximately double the estimates using fronds and since the latter estimates were not clearly superior, adult spawner biomass may be 3100 tonnes greater than estimated with fronds.

The 1982 estimate of spawner biomass on the North Coast, when diving surveys were also conducted, was for 7853 tonnes (Table 9). The 1986 estimate is 3.2 times greater at 24,354 tonnes. Hence, stocks have increased substantially, presumably due to average and good recruitments (Haist et al. 1986). Compared to 1982, spawn length increased only by 12% to 55 km and spawn area by 75% to 735 ha. The increased spawner biomass was mostly accomodated by increases in egg density and increased spawn width. Increased spawn width was principally due a southward shift in spawning location in Area 4N.

ACKNOWLEDGMENTS

We would like to thank the divers who collected and processed the samples. They were B. Emmett, C. Hand, and P. Frank from Archipelago Marine Research; Fisheries and Oceans technicians D. Miller and K. Bates; and Fishery Officers R. Melvin and R. Wilson. The diving survey was conducted from the M.V. BASTION CITY under R. Littlejohn.

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Table 1. Summary of survey information for spawns sampled by divers on the North Coast in 1986.

Location	All spawn		Spawn on understory vegetation					Spawn on *Macrocystis* sp.					
	No. of tran.	Length (m)	No. of tran.	No. of quad.	Length (m)	Av. tran. len. (m)	Av. egg layers	No. of tran.	Plants samp.	Length (m)	Av. tran. len. (m)	Av. plt. ht. (m)	Av. egg layers
South Island	2	400	2	8	400	28	0.1	0	-	-	-	-	-
Shattock Point	4	3140	4	24	3140	90	0.8	0	-	-	-	-	-
Simpson Point	3	2190	3	13	2190	55	0.3	0	-	-	-	-	-
Ryan Point	3	6800	3	38	6800	421	0.7	2	2	3600	80	9.5	0.7
Hunt Inlet	14	6237	3	19	237	196	0.6	11	13	6000	24	10.1	1.2
Hunt In. - Hd.	SD[a]	540	0	0	540	100	0.6	0	-	-	-	-	-
All locations	26	18767	15	101	12767	163	0.6	13	15	9600	33	10.0	1.1

[a]Spot dives

Table 2. Description of transect slope and outer (OES) and inner (IES) edge of spawn.

	Slope	OES	IES
Average	0.0204	-0.6	1.6
S. D.	0.0145	2.0	0.8
95% C.I.	0.0124 to 0.0284	-1.7 to 0.5	1.2 to 2.1
Max.	0.0454	1.5	2.9
Min.	0.0026	-7.1	0.1

Table 3. Wilcoxon mean and estimated 95% confidence interval for % cover of vegetation, egg layers, sample weight, and egg density for spawn on understory vegetation sampled by divers on the North Coast in 1986 in the intertidal (above 0 m chart datum) and subtidal (0 to 3 m below chart datum) zone. Samples with less than 0.1 egg layers were excluded.

	Intertidal	Subtidal
No. of samples	57	19
% cover	63 (53 to 68)	55 (40 to 70)
egg layers	0.7 (0.5 to 1.1)	0.4 (0.3 to 0.8)
sample weight (g)	1600 (1173 to 2029)	1619 (1035 to 2670)
Thousands of eggs per sq. m	253 (157 to 418)	123 (73 to 236)

Table 4. Number of samples by dominant vegetation on which herring spawn was deposited, separated by 3 m depth intervals, for the North Coast in 1986.

	Above 0 m	0 to -3 m	-3 to -6 m
Sea grasses	28	6	0
Rockweed	5	0	0
Kelp	4	5	1
Foliose algae	1	0	0
Filamentous algae	19	8	1
Total	57	19	2

Table 5. Estimates of egg deposition on Macrocystis sp. for spawns on the North Coast in 1986. Confidence intervals (95%) are in brackets.

	Ryan Point	Hunt In. (Diving)	Hunt In. (Surface)
Area (ha)	41.34	23.57	7.52[a]
Density (per ha) of			
- plants	2094	3177	3177
- all fronds	10219	28910	28910
- mature fronds	6688	20583	20583
Thousands of eggs per			
- plant	2668 (-)	3295 (1800 - 4791)	3295 (1800 - 4791)
- frond (all)	196 (-)	224 (131 - 316)	224 (131 - 316)
- frond (mature)	227 (-)	287 (169 - 406)	287 (169 - 406)
Tonnes estimated from			
- plants	2310 (-)	2468 (1348 - 3587)	787 (430 - 1145)
- fronds (all)	830 (-)	1523 (895 - 2151)	486 (286 - 686)
- fronds (mature)	627 (-)	1394 (819 - 1969)	445 (261 - 628)

[a]Area was calculated from surface survey width and diving survey area and length [Area = (1915 • 23.57) / 6000)].

Table 6. Estimates of spawner biomass for spawns surveyed by divers on the North Coast in 1986. Confidence intervals (95%) are in brackets.

Location	Egg substrate	Area (ha)	Thousands of eggs per sq. m	Tonnes of spawners
Area 4N				
South Island	Understory	1.81	38 (31-45)	7 (6-8)
Shattock Point	Understory	26.70	298 (171-426)	797 (457-1137)
Simpson Point	Understory	19.66	112 (0-234)	221 (0-461)
Ryan Point	Understory	288.48	314 (154-473)	9054 (4455-13654)
	Macrocystis	41.34	-	627 (-)
	Both	288.48	-	9681
Area 4S				
Hunt Inlet	Understory	9.16	110 (0-230)	100 (0-211)
	Macrocystis	23.57	-	1394 (819-1969)
	Both	32.73	-	1494

Table 7. Estimates of spawner biomass for spawns surveyed only from the surface on the North Coast in 1986.

Locality	No. of patches	Length (m)	Av. width (m)		Area (ha)	Av. egg layers	Thousands of eggs per sq. m	Tonnes
			obs.	adj.				
Area 3								
Stumaun Bay	1	600	30	81	4.88	1.1	192	94
E. Finlayson Island	6	350	17	66	2.30	1.4	223	51
Area 4N								
W. Finlayson Island	13	2290	33	84	19.30	1.4	223	431
Pearl Harbour	1	200	30	81	1.63	0.5	128	21
Burnt Cliff Island	2	580	34	85	4.94	1.6	244	121
Shattock Point	2	730	38	89	6.49	1.2	202	131
Big Bay	6	1450	226	173	25.15	0.3	107	270
Tree Bluff	15	4350	179	159	69.12	2.5	339	2344
Slippery Rock	2	550	296	192	10.55	0.9	171	180
Duncan Bay	2	1700	51	99	16.87	3.6	455	768
Tugwell Island	4	2800	207	168	46.98	2.6	350	1643
Devastation Island	2	310	23	74	2.28	2.4	329	75
Area 4S								
Hunt Inlet[a]	8	1915	18	39	7.52	1.2	-	445
Malacca Passage	3	1000	51	99	9.92	2.5	339	436
Area 5N								
Porcher Peninsula	2	400	18	66	2.64	8.0	918	242
Freeman Passage	27	10310	30	76	78.50	2.1	326	2557
Willis Bay	10	1740	55	92	16.03	2.2	482	772
Viscount Point	18	855	20	57	4.85	1.7	321	156
Wally Bay	12	1620	36	83	13.37	2.9	339	454
Area 5S								
Kingkown Inlet	9	2175	58	103	22.39	3.5	430	963

[a]Spawn on *Macrocystis* sp. estimates from Table 2.

Table 8. Estimated optimal sampling design to achieve a SE of 25% of the mean (after Schweigert et al. 1985) and achieved sampling density for 1986 diving surveys of herring spawn on the North Coast.

Location	Samples per transect	Av. transect length (m)	Achieved sampling fraction	Optimal sampling fraction	Achieved transects per km	Optimal transects per km
South Island	4.0	28	0.143	0.729	5.000	0.741
Shattock Point	6.0	90	0.067	0.106	1.274	1.614
Simpson Point	4.3	55	0.079	0.056	1.370	8.433
Ryan Point	12.7	421	0.030	0.028	0.441	1.014
Hunt Inlet	6.3	196	0.032	0.039	12.658	87.113

Table 9. Estimates of herring spawn and adult herring biomass for the North Coast for years (1982 and 1986) when diving surveys were conducted.

Year	Diving Survey			Surface survey			Both surveys		
	Length (m)	Area (ha)	Spawners (tonnes)	Length (m)	Area (ha)	Spawners (tonnes)	Length (m)	Area (ha)	Spawners (tonnes)
Area 3									
1982	1000	4.07	77	10650	35.69	620	11650	39.76	697
1986	-	-	-	950	7.16	145	950	7.16	145
Area 4N									
1982	13100	163.16	3276	1720	25.58	275	14820	188.74	3551
1986	12530	336.65	10706	14960	203.31	5984	27490	539.96	16690
Area 4S									
1982	5800	19.84	386	-	-	-	5800	19.84	386
1986	6777	32.73	1494	2915	17.44	881	9692	50.17	2375
Area 5N									
1982	13600	142.90	1697	3516	29.12	1252	17116	172.02	2949
1986	-	-	-	14925	115.39	4181	14925	115.39	4181
Area 5S									
1982	-	-	-	-	-	-	-	-	-
1986	-	-	-	2175	22.39	963	2175	22.39	963
North Coast total									
1982	33500	329.97	5436	15886	90.39	2147	49386	420.36	7583
1986	19307	369.38	12200	35925	365.69	12154	55232	735.07	24354

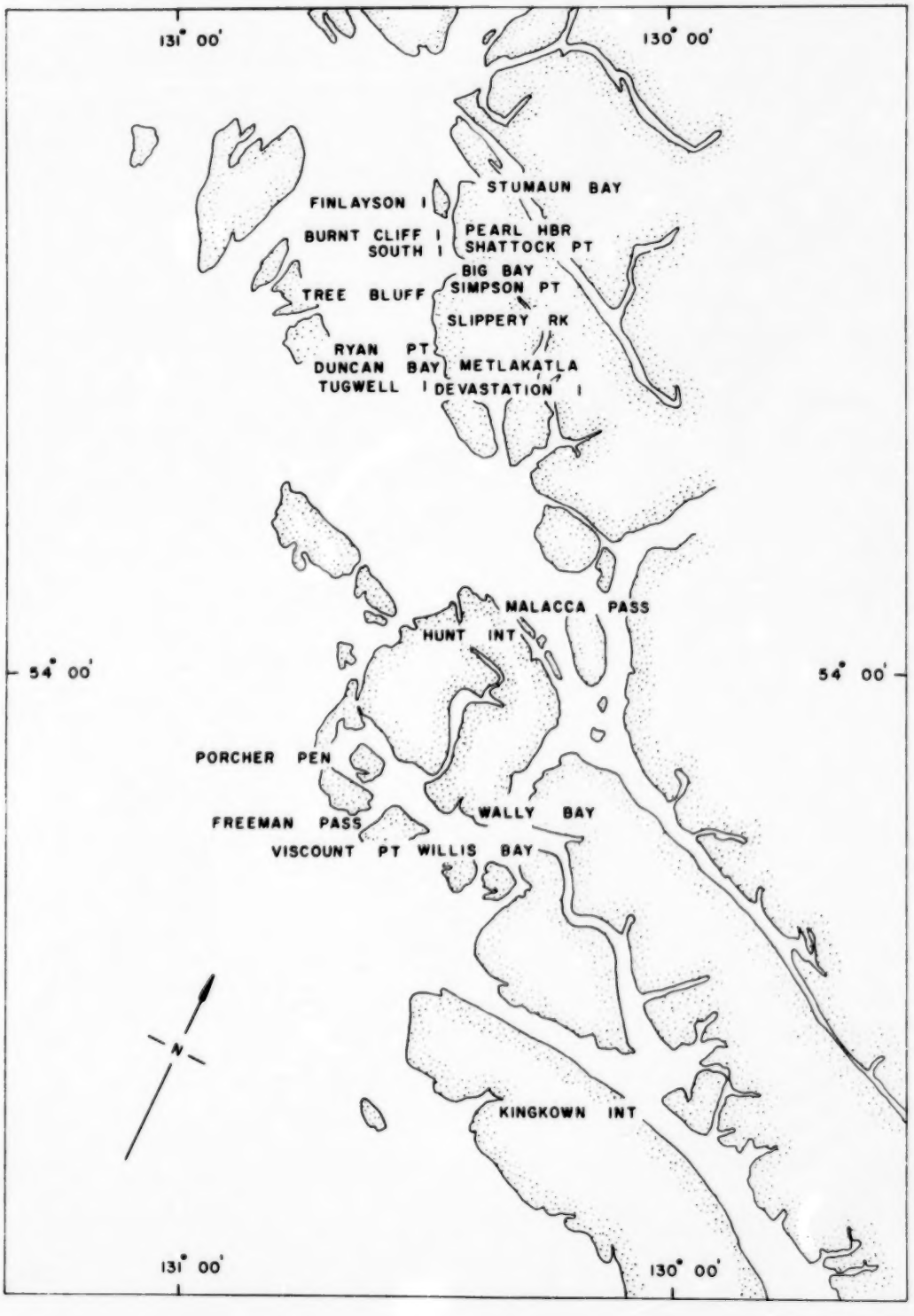

Fig. 1. Location of 1986 North Coast herring spawn survey study sites.

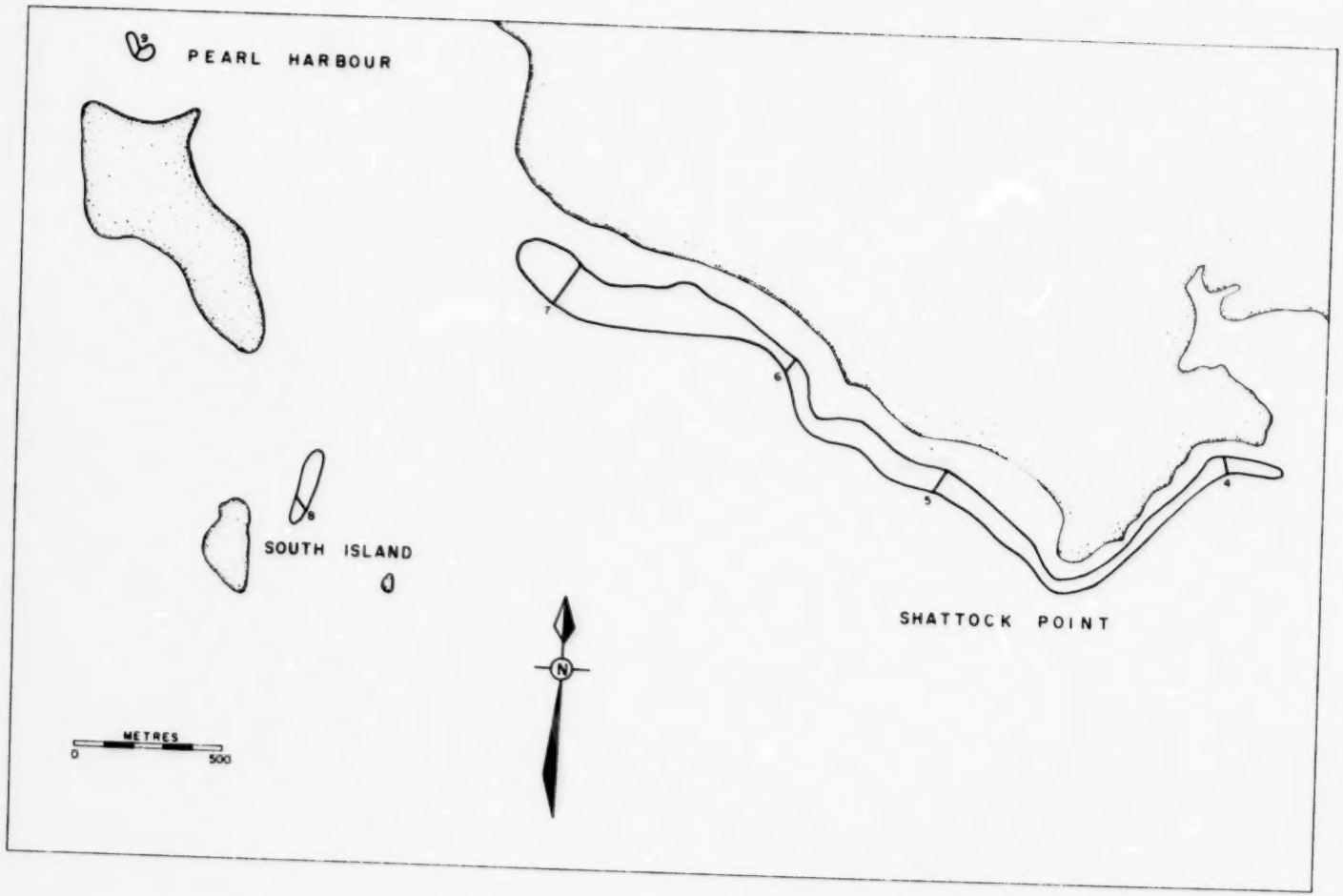

Fig. 2. Herring spawn at South Island and Shattock Point in Chatham Sound, surveyed by divers in 1986, with transect locations shown.

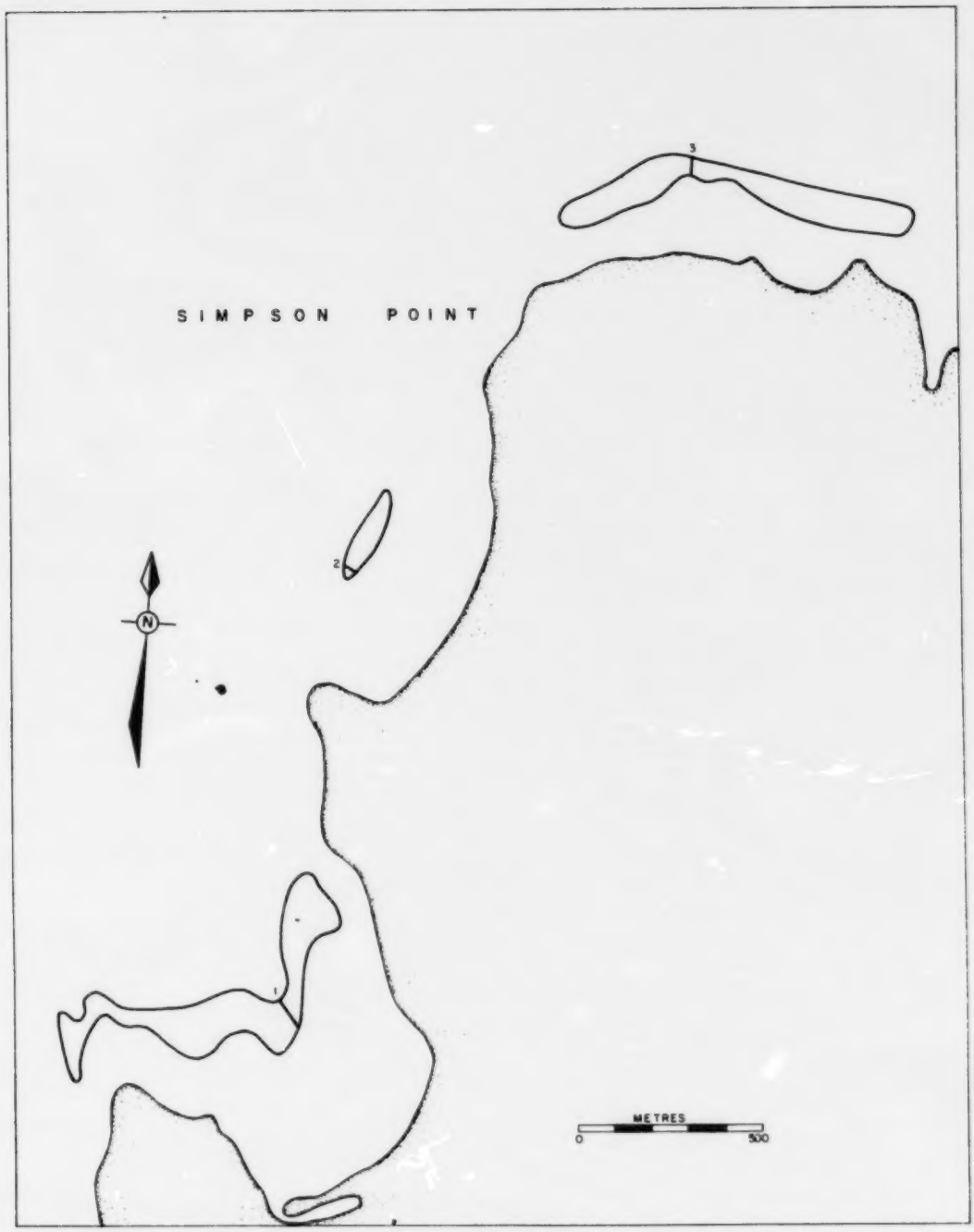

Fig. 3. Herring spawn at Simpson Point in Chatham Sound, surveyed by divers in 1986, with transect locations shown.

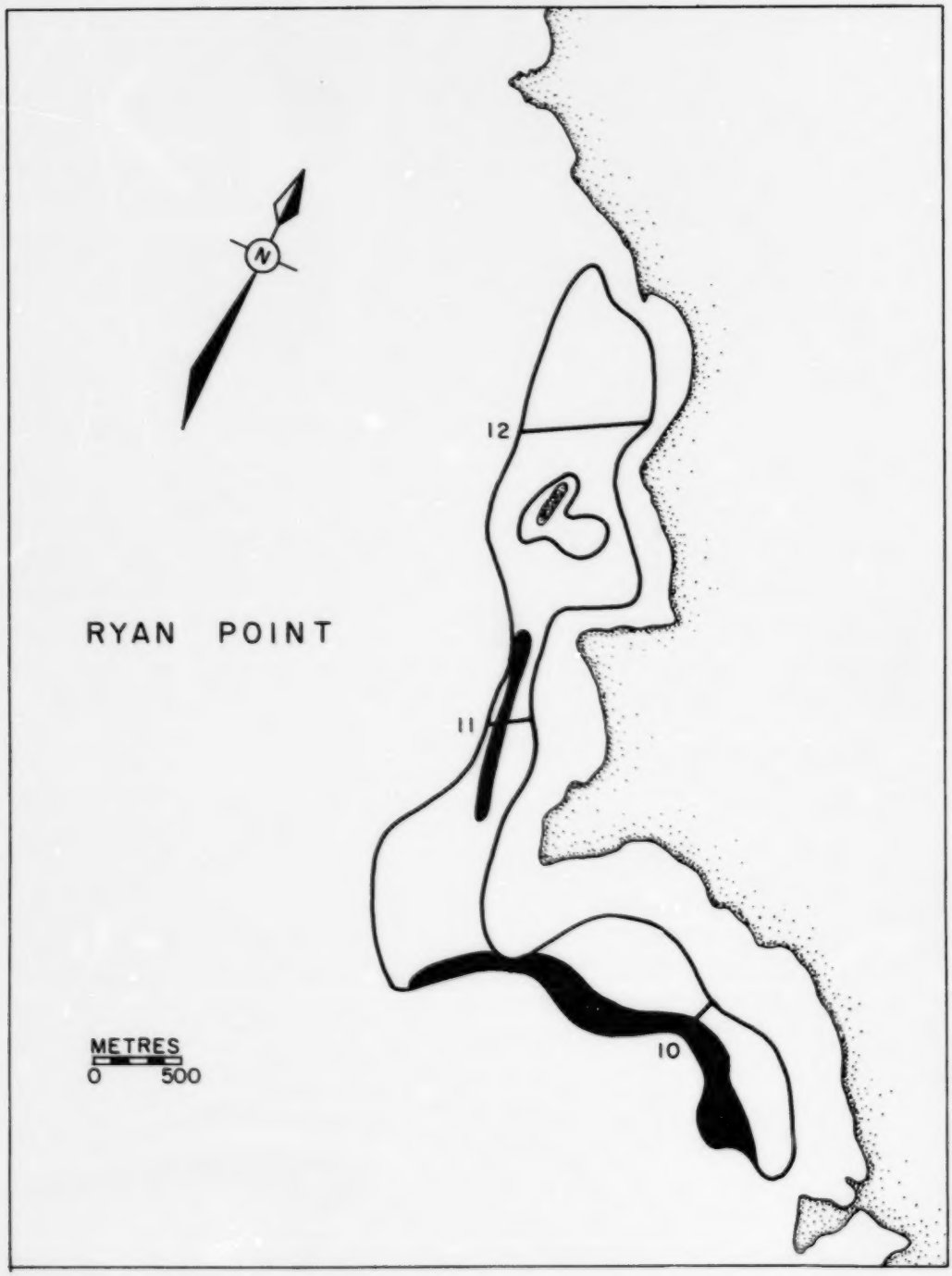

Fig. 4. Herring spawn at Ryan Point in Chatham Sound, surveyed by divers in 1986, with transect locations shown. Shaded area shows where spawn was deposited on Macrocystis sp.

Fig. 5. Herring spawn in Hunt Inlet on north Porcher Island, surveyed by divers in 1986, with transect locations shown. Shaded area shows where spawn was deposited on Macrocystis sp.

Appendix Table 1. Macrocystis sp. transect information for spawns surveyed by divers on the North Coast in 1986. (MP = mature plants, IP = immature plants, MF = mature fronds, IF = immature fronds, AF = all fronds.)

Location	Transect no.	Transect length (m)	Surveyed area (sq. m)	No. of plants		No. of MP fronds			No. of IP-IF
				MP	IP	MF	IF	AF	
Ryan Point	10	80	160	65	4	189	95	284	5
	11	80	160	2	0	25	18	43	0
	Total		320	67	4	214	113	327	5
Hunt Inlet	1	25	50	32	0	199	79	278	0
	2	29	58	37	5	222	70	292	8
	3	20	40	16	0	67	47	114	0
	5	10	20	3	1	31	11	42	1
	7	32	64	24	3	157	81	238	6
	8	50	100	19	0	174	43	217	0
	9	30	60	13	0	65	28	93	0
	10	13	26	2	0	12	7	19	0
	12	20	40	8	0	35	35	70	0
	13	14	28	3	2	23	5	28	5
	14	23	46	12	1	110	37	147	3
	Total		532	169	12	1095	443	1538	23

Appendix Table 2. Results for harvested Macrocystis sp. plants collected on the North Coast in 1986. (MP = mature plants, MF = mature fronds, AF = all fronds.)

Location	Transect no.	Plant no.	Height (m)	Egg layers	No. fronds		Thousands of eggs per			Plant eight (g)
					MF	AF	MP	MF	AF	
Ryan Point	10	1	7	0.12	8	8	218	27	27	3770
		2	12	1.25	12	14	5118	427	366	44607
Hunt Inlet	1	1	16	1.00	11	16	8351	759	522	33882
		2	11	0.70	18	21	7300	406	348	35475
	2	1	10	1.10	16	18	3454	216	192	15176
	3	1	7	0.30	8	11	1309	164	119	10269
	5	1	5	0.14	9	11	267	30	24	4011
	7	1	15	0.84	21	25	4366	208	175	41916
	8	1	11	0.90	12	14	4938	412	353	29367
	9	1	6	0.90	7	11	943	135	86	7696
	10	1	8	1.60	9	12	1962	218	164	10909
	11	1	9	4.50	6	7	3201	534	457	11184
	12	1	8	0.90	11	16	2638	240	165	14535
	13	1	6	1.70	12	15	3472	289	231	13968
	14	1	19	0.44	5	9	636	127	71	8358